# MATH2090 – Mathematics of Finance

## Assignment 6

**Name:**

**MUN Number:**

**Due Date:** Friday, October 27

1. Construct an amortization schedule for a loan of $10,000 at 5% annual interest, with loan repayments made in equal instalments at the end of each 6 monthly period for a term of four years.

2. Consider a loan of $15,000 at an annual interest rate of 5.3% where the interest is paid annually and a sinking fund is established to repay the loan amount in equal payments, made at the end of each month, for five years. If the sinking fund has an annual interest rate of 4.2% find the following:

   (a) The annual interest payment.

   (b) The monthly sinking fund payment.

   (c) The annual outlay. What annual interest rate must the sinking fund have so that the borrower's annual outlay is equal to that on an amortized loan (with interest at 6.3% annually and monthly repayments)?

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3. A loan of $10,000 is repayable over five years, with end of month payments at 7.4% annual effective interest, to the *Easy Finance Company*. However at the end of the first year (just after the 12th loan payment) *Easy* files for bankruptcy and the loan is sold to *Vulture Investments* which demands that the remaining loan returns 14% annual effective interest. What price should *Vulture* pay?

4 . Ten years ago Hilary took out a home mortgage of $145,000 at 5.1%, convertible semi-annually and equal end of month payments over a 20 year term. Hilary would now like to refinance the loan by making a lump sum payment of $25,000 and then pay off the remaining loan over the next ten years under the same conditions as her previous loan. Find the new monthly repayments, and the total of all Hilary's payments, under each of the three circumstances listed below.
In each case calculate the lender's effective annual yield rate over the full term (old plus refinanced) of the loan(s).

   (a) The lender accepts Hilary's plan and agrees to the annual interest rate of 5.4% convertible semi-annually over the ten years.

   (b) The lender agrees to the annual 5.1% interest convertible semi-annually over the next ten years, but insists that the payments must allow for an annual effective inflation rate of 2.1%.

   (c) The lender agrees to the annual 5.1% interest convertible semi-annually, but insists that the term of the new loan should be five years.

   [Hint: If $i$ is the lender's yield rate then lender's accumulated value at the end should be equal to $135000(1+i)^n$, with $n = 20$ or 15.]